

## **High Compression Ratio, Hydrogen Enhanced Engine System**

### **Abstract of the Disclosure**

5           A hydrogen enhanced engine system using high compression ratio is optimized to minimize NOx emissions, exhaust aftertreatment catalyst requirements, hydrogen requirements, engine efficiency and cost. In one mode of operation the engine is operated very lean (equivalence ratio  $\phi = 0.4$  to  $0.7$ ) at lower levels of power. Very lean operation reduces NOx to very low levels. A control system is used to increase equivalence ratio at increased torque or  
10 power requirements while avoiding the knock that would be produced by high compression ratio operation. The increased equivalence ratio reduces the amount of hydrogen required to extend the lean limit in order to avoid misfire and increases torque and power. The engine may be naturally aspirated, turbocharged, or supercharged.